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Observed outcome and comparison to pediatrics Index Mortality 3 score of patients admitted to pediatric intensive care units at TASH, Ethiopia: A Prospective Cohort Study 2024.

A research thesis to be submitted to the Department of Paediatrics and Child Health, School of Medicine, College of Health Sciences, Addis Ababa University as partial fulfilment of the requirements for specialty certificate in paediatrics and child health

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Addis Ababa, Ethiopia, February 2025.



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APPROVAL SHEET

**ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCES,
SCHOOL OF MEDICINE, DEPARTMENT OF PEDIATRICS AND CHILD
HEALTH**

I, the under signed Pediatrics and Child health resident, declare that I have submitted my original research thesis on the title observed outcome and comparison to pediatrics Index Mortality 3 score of patients admitted to pediatric intensive care units at TASH Hospital, Ethiopia: in partial fulfilment of the specialty program.

Submitted by:

Name of resident

Signature

Date

Dr. Melaku Moges

This is a research thesis work has been submitted with my approval as an advisor.

Approved by:

Advisor

Signature

Date

Dr.Melat Tesfaye



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List of abbreviations/ acronyms

AUR- Area under the curve

AROC -Area under the curve of the receiver operating characteristic curve

CI-Confidence Intervals

CPR-Cardiopulmonary resuscitation

ICU-Intensive care unit

JMC-Jimma medical center

PI - Principal Investigator

PICU- Pediatrics Intensive Care Unit

PIM- Pediatrics Index mortality.

SMR- standardized mortality ratio

SPMMC- St Paul's Hospital Millennium Medical College.

SPSS-Statistical Package for Social Science

SRS-Simple Random Sampling

TASH- Tikur Anbessa Specialized Hospital



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Summary

Background: Pediatric index of mortality 3 (PIM 3) score is an illness severity and scoring systems used for predicting outcome of children admitted to PICU. It is an integral part of providing ICU care and used as performance indicators of ICUs.

Objectives: To determine outcome and comparison to pediatrics Index Mortality 3 score of patients admitted to pediatric intensive care units at TASH Hospital, Ethiopia: A Prospective Cohort Study (2024 GC).

Methods: Hospital based Prospective cohort study design was employed from October, 2024 to February, 2024 to determine observed outcome and comparison to pediatrics Index Mortality 3 score of patients admitted to pediatric intensive care units at TASH Hospital, Ethiopia. Data were collected by structured checklists adapted from different pieces of literature, through history taking, patient document review, and physical examination. The PIM-3 was scored within the first hour of admission. The standardized mortality ratio (SMR) was calculated using the Mid-P exact method. The discriminatory function was assessed by the area under the receiver operating characteristic (ROC) curve.

Result: A total of 74 participants with a median age of 48.5 months at admission were included in this analysis. Of those 52.7% were males. The median duration of hospital stay was four days (IQR: 1–6). A total of 19 (25.7%) children died during the study period. The overall predicted mortality rate by the PIM-3 score was 16.4%, giving an SMR of 1.56 (95% CI: 2.11, 3.95). The area under receiver operating characteristics (AUROC = 0.84, 95% CI: 0.75–0.95).

Conclusion: The PIM-3 had a good discriminatory function can be used to prioritize care and for the assessment of the quality of care.



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1. INTRODUCTION

1.1 Background

Treating patients with severe organ failure is the goal of the collaborative specialty known as intensive care which encompasses a variety of professions and disciplines. A unique independently run and specially furnished area of medical facilities the Pediatric Intensive Care Unit (PICU) offers comprehensive care for critically ill children with the goal of reducing the mortality rate among those who are at high risk of passing away (1).

The ability to predict pediatric mortality is crucial for protecting children facilitating focused interventions and allocating funds to prevent fatal consequences (2). In order to evaluate therapy assess patient prognosis and evaluate the quality of the intensive care unit it is critical to be able to predict mortality in critically ill patients. A scoring system for outcome prediction that aids in clinical decision-making is the Pediatric Index of Mortality 3 score (3).

A quantitative clinical score offers a more objective way to assess a patient's condition because doctors may treat them inconsistently or incorrectly. Clinical decision-making is aided by these scoring systems which are used to evaluate the prognosis and severity of diseases. One of the most popular scoring methods for predicting mortality is the pediatric index of mortality (PIM). In comparison to the other tools it is easy to use requires less data and has no licensing costs (3). For the PIM 3 score the corresponding sensitivity and specificity are 82.35 % and 97.56 % (4).



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Pediatric intensive care units (ICUs) have been using a variety of scoring systems since the early 1980s to assess patients disease severity. These scoring systems make it possible to compare the quality of care provided in various intensive care units and help predict patient mortality. The pediatric index of mortality (PIM) one of the scoring systems has been regarded as a representative model. The PIM is a straightforward model that was created using data gathered from pediatric intensive care units in Australia the United Kingdom and New Zealand between 1994 and 1996. It included ten variables that were measured at the time of ICU admission (5).

The PIMs functions included predicting mortality as well as assessing the standard of medical care and maximizing resource utilization (5). In clinical practice it is widely used and has been validated in a variety of PICU settings across multiple nations. Observed/expected mortality or the standardized mortality ratio is also computed using PIM 3 to evaluate and contrast results across various PICUs. Using 11 variables gathered from the moment of first patient contact until one hour after arrival in the PICU the PIM 3 score is determined. Regretfully some of the variables (e. g. G. Pao₂) might not be accessible prior to or within an hour of PICU admission. As a result PIM 3 was created to substitute normal values for those missing input variables (6).



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The ability of a PICU to save the lives of seriously ill or injured children is a key indicator of the quality of care provided there. Therefore it is essential to have a validated measure of mortality risk in order to facilitate performance benchmarking. It appears that this benchmarking is especially pertinent in nations with limited resources (7). In certain nations PIM3 has been validated since it was published. However studies with a small number of patients or a few PICUs were used for validation. External validation studies are required for use in populations that differ from the original study population. These populations may have different patient profiles and as a result perform differently (8).

In environments with limited resources such as Ethiopia where there is a high rate of child mortality and a lack of child care facilities the PIM scoring system is the most effective method for estimating the likelihood of death (9).



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1.2. Statement of the problem

Because of improvements in medical care high-income countries have reported significantly lower mortality and morbidity rates after admission to pediatric intensive care units (PICUs) in recent decades. Ethiopia and other low- and middle-income nations continue to have higher rates of child ICU admission mortality (10).

The mortality rate is a crucial metric for evaluating the quality of an intensive care unit (ICU). However the mortality rate is significantly impacted by the comorbidities demographics and severity of the patient's illnesses. Accordingly comparing the unadjusted mortality rate across intensive care units (ICUs) without taking severity or other case mix factors into account could result in an inaccurate assessment of ICU quality (11).

In order to evaluate patients and their overall outcomes intensive care outcome assessment calls for precise and user-friendly techniques. Physicians rely on estimating the risk of death in the intensive care unit (ICU) to evaluate patient prognosis plan appropriate therapies and assess performance and resource utilization. However the sensitivity of mortality-predicting models to the population necessitates a pilot study prior to implementation in any PICU (12).

Because every intensive care unit treats a distinct patient population a customized predictive model should be created for every hospital in order to verify the models applicability. External validity should be assessed for the results generalizability prior to implementing a predictive model in a specific population (13).



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Most research on PICU scoring systems is conducted in developed countries while studies conducted in developing countries have produced conflicting findings. Some authors have concluded that these models have poor discriminatory ability and under predict actual mortality (14).

Studies on paediatric critical care outcomes and mortality predictors in PICUs are scarce in Ethiopia (10). Reports regarding the implementation of the pediatric index of mortality scoring system in African developing nations are scarce despite the fact that it has been validated in both developed and developing nations (15).

This study aims to compare the observed and expected death rates using the standardized mortality ratio determine whether the model is calibrated to our case mix and assess the utility of the PIM 3 score in predicting mortality in our PICU.



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1.3. Significant of the study

The baseline data pertaining to the outcomes of paediatric patients admitted to the intensive care unit are evaluated by the study. Once the precise predictor associated with survival has been identified the results of this study will be used as baseline data to improve child mortality admitted to PICU.

Researchers can utilize this study to investigate topics such as post-discharge survival and appropriate use of the PIM 3 score in paediatric intensive care units across various hospitals.

To reduce mortality and enhance the quality of care at PICU the results of this survey will be useful to other researcher's educator's policy makers and governmental and nongovernmental organizations as a starting point for activities and bolstering the use of available resources. Additionally it will be very helpful in providing fundamental knowledge that can aid in the planning and execution of various activities aimed at enhancing the survival of children admitted to the intensive care unit.



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1.4 Conceptual frame work

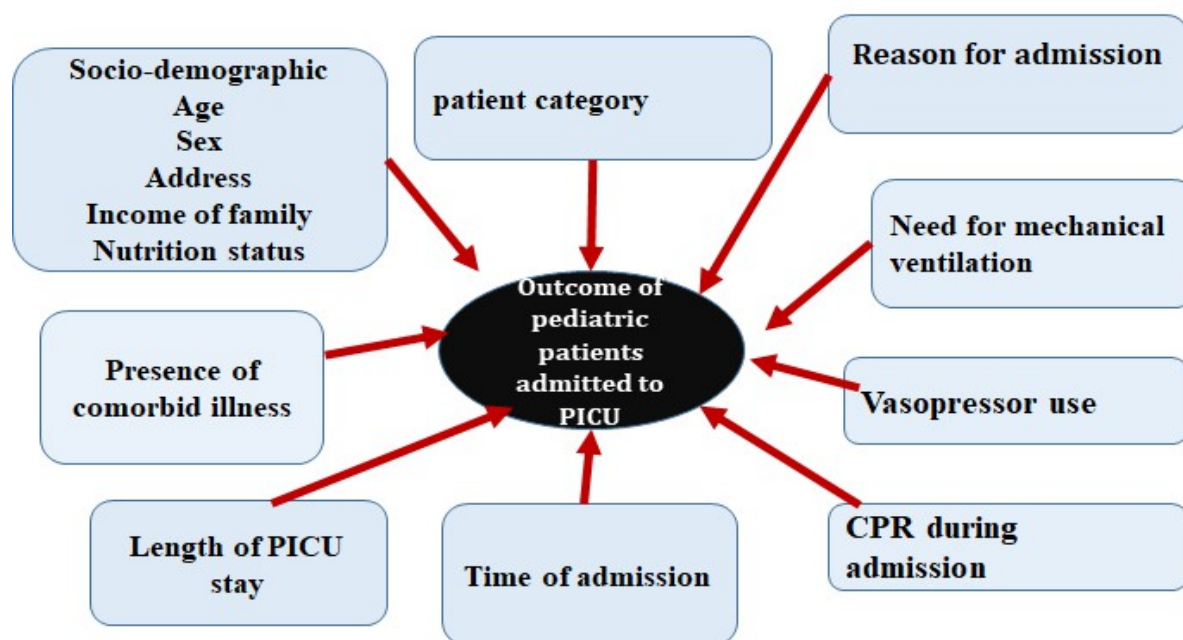


Figure 1. Conceptual frame work of observed outcome and comparison to PIM 3 score of patients admitted to PICU.



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2. LITERATURE REVIEW

2.1 Outcome of patients admitted to PICU.

In India a retrospective study was conducted on 600 patients who were admitted to the PICU between January 1 2016 and December 31 2016 and who were between the ages of 28 days and 12 years. 168 (28%) of the 600 patients admitted to the PICU passed away. 315 (52. 5%) of the cases got better. Those who were transferred to a higher centres or another department or who were taken against medical advice made up 117 cases (19. 5%) (16).

Patients admitted to the Pak Emirates Military Hospital Rawalpindis pediatric intensive care unit participated in a prospective observational study which documented their mortality and discharge rates. Of the 531 kids admitted within 6 months 223 (42 percent) were girls and 308 (58 percent) were boys. There was a 26. 6% mortality rate (17).

Children admitted to the PICU at Muhimbili National Hospital in Tanzania were the subjects of a hospital-based prospective cohort study between July 2021 and May 2022. Of the 323 children recruited 177 (54. 8%) were male and their median age was 17 months (1-168). 161/323 children perished resulting in a 49. 8% overall mortality rate (18).

In Malawi children admitted to the PICU between August 1 2017 and July 31 2019 were the subjects of a prospective study. 149 children or 28 %died out of the 531 children who were admitted to the PICU (19).



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In a chosen tertiary care hospital in Ethiopia a prospective observational study was carried out in a health facility from October 2020 to May 30 2021. 206 patients were included out of 217 consecutive patients who were admitted to the pediatric intensive care unit at JMC and SPHMMC over an 8-month period. In the PICU 147 patients (71. 4 percent) survived during the study period while 59 patients (28. 6 percent) died (1).

The Millennium Medical College in Addis Ababa Ethiopia conducted another institutionally based cross-sectional study at St. Pauls Hospital. Chart abstraction was used to gather information from patients who were admitted to the PICU between January 2017 and December 2018. The analysis included 260 pediatric patients in total. At admission the M: F ratio was 1:4:1 and the mean age was 48.13 ± 53.65 months. The PICU had a 21. 1% mortality rate (20).

One hundred twenty four (39. 1%) of the 332 pediatric patients admitted during the study period came from paediatric emergency departments according to a retrospective study conducted on patients admitted to the pediatric intensive care unit at Tikur Anbessa Specialized Hospital in Addis Ababa Ethiopia between January 2021 and June 2022. Twenty-five days was the median length of stay for pediatric intensive care unit patients. While gastrointestinal disease 10 (3. 2 %) was the least frequent admission diagnosis respiratory issues accounted for the majority of patients admitted to the pediatric intensive care unit 71 (22. 4 %) and 39. 3 % was the mortality rate(21).



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2.2. Comparison of outcome of patients to PIM 3 score.

PICU patients at Latifa Hospital in Dubai participated in a cohort observational study between January 2016 and October 2018. 46 (7.9%) of the 583 patients who were enrolled in the study passed away. The observed mortality rate was 15% lower than the 9.2 expected mortality rate based on the PIM 3 score. PIM 3 will be used to predict mortality in PICU patients at Latifa Hospital in Dubai according to the findings (22).

Case records and patient information from every admission to the PICU of Mofid Childrens Hospital in Tehran between October 2017 and February 2018 were analysed retrospectively. There were 365 children in this study and the overall mortality rate was 10.4%. With a mean of 1 point 45 percent the patients PIM-3 scores varied from 0 point 06 percent to 2 point 37 percent (95 percent confidence interval). Thus by multiplying the initial PIM-3 score by the expected probability of death the Paediatric Index of Mortality-3 score can potentially be applied in any PICU (23).

The ability of PIM 3 to forecast the outcomes of critically ill PICU patients admitted to Sanglah Hospital in Indonesia between the ages of one month and eighteen was evaluated through a prospective cohort study. In terms of mortality prediction the ideal PIM 3 score limit was ≥ 48 with an area under the curve (AUC) of 76 percent (95 percent CI 0.69 to 0.85) (3).



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A prospective study was conducted to assess the effectiveness of the Pediatric Index of Mortality 3 as a mortality risk assessment model which included all admissions for 12 years from 30 days to 18 years of age in South Africa's tertiary or quaternary academic hospitals in 2016 and 2017. Male patients made up 2253 (61. 3%) of the 3681 admissions. A total of 354 deaths (9. 6%) were reported (7).



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3. OBJECTIVES

3.1. General objective

- ❖ To determine observed outcome and comparison to pediatrics Index Mortality 3 score of patients admitted to pediatric intensive care units at TASH, Ethiopia

3.2. Specific objectives

- ❖ To determine the observed outcome of pediatrics patients admitted to pediatric intensive care units at TASH
- ❖ To compare the observed outcome and pediatrics Index Mortality 3 score of patients admitted to pediatric intensive care units at TASH, Ethiopia



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4. METHODOLOGY

4.1. Study Area and Setting

Study was conducted at PICU of TASH.

4.2. Study Design and Study Period

Hospital based Prospective cohort study design was employed from October, 2024 to February, 2025

4.3. Source and Study Population

4.3.1. Source population

The source population was all children admitted at TASH during the study period.

4.3.2 Study population

Children who were admitted at PICU, TASH during period of study.

4.4. Sample size determination and Sampling procedure

4.4.1 Sampling procedure

Simple proportion formula was used to calculate the sample size.



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4.4.2. Sample size determination

The required sample size calculated based on a study done in Ethiopia.

- N = total calculated sample size
- $Z = 1.96$
- $P = 43.8\%$ (0.438) was taken from similar study conducted at Tikur Anbessa
- $q = 1 - p$ which is equivalent with 0.562
- d = Margin of error 5% or 0.05

$$N = Z^2 Pq / d^2$$

$$N = 1.96^2 \times 0.438 \times 0.562 / 0.05^2$$

- Total calculated sample size = 378
- Because of our target population is less than 10 000; the optimal sample size was optimized as follows.
- $nf = No / (1 + No / N)$, where nf is equivalent with the corrected sample size and N is taken from the previous admission (82)
- $Nf = 378 / (1 + 378 / 82) = 67$
- Ten percent contingency was added then, the final sample size is 74.

4.5. Inclusion and exclusion criteria

4.5.1. Inclusion criteria

All pediatrics patients, between the ages of 30 days - 15 years who had admission at PICU including readmissions.

4.5.2. Exclusion criteria

- i. Those patients died within 2 hours
- ii. Patients went against medical advice.



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4.6. Study variables

4.6.1. Dependent variables

Hospital outcome death or survival

4.6.2. Independent variables

- ✓ Socio demographic characteristics
- ✓ Patient category based WHO ICD-10 code
- ✓ Reason for admission
- ✓ Presence of comorbidity other than the underlined disease
- ✓ Time of hospital stay
- ✓ Need for mechanical ventilation
- ✓ Vasopressor use
- ✓ Cardiopulmonary resuscitations during admission
- ✓ Time of admission

4.7. Data Collection method and tools

Preliminary data was collected to know number of pediatrics patients admitted at TASH, PICU. A structured questionnaire which includes socio-demographic data, clinical profile of patients and PIM 3 parameters was employed to gather the primary information. It was collected by second year and above pediatric residents assigned to PICU during data collection period within the first one hour of admission. The questionnaires adopted from international standardized updated PIM 3 score parameters and different literatures.



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4.8. Quality Control of the Data

Data was gathered using a structured validated and trustworthy modified questionnaire. On the first day of the rotation supervisors and data collectors received a half-day of training. Five percent of the total calculated sample size was used for a pre-test to ensure the quality of the data the completed questionnaires were verified for completeness. Supportive supervision on the spot was the responsibility of both the hired supervisors and the PI.

4.9. Data processing and analysis

Data collected within a day of PICU admission were used to compute PIM 3 scoring. The observed result was compared to the PIM 3 score and recorded as either death or discharge. The PIM 3 calculator was used to determine the PIM 3 score and SPSS was used for analysis. The receiver operating characteristic curves area under the curve (AUROC) was used to determine the PIM3 scores discriminatory function between death and survival. The standardized mortality ratio (SMR) which is determined from the observed and expected mortality rate using the Mid-P exact method and AUROC was used to compare the performance of the PIM-3 score across age diagnoses and nutritional status. Descriptive summaries graphs and various frequency tables were employed to examine the variables.



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5. ETHICAL CONSIDERATIONS

We received ethical approval from Addis Ababa University College of Health Sciences. A formal letter was written to the TASH administrative team requesting support and permission. For every study participant informed consent was acquired.

6. DISSEMINATION OF FINDINGS.

This study results were shown in both tabular and graphical formats. The study findings were discussed on the day of the research defence and both hard and soft copies of the formal report will be sent to the Department of Pediatrics and Child Health. Additionally the results of the study will be published in national or international scientific journals.



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7. RESULTS

7.1 Socio-demographic and clinical characteristics of children admitted to the pediatric intensive care unit.

Males made up 52.7% of the study participants while the majority were in the 28. 4% age group with a median age of 48.5 months. The majority of the participants had a hematologic oncologic diagnosis followed by renal issue and 31% of them had SAM. A complication other than the underlying cause was present in 17% of the participants and 61% of the admissions was in the ward. Nearly 60% of cases required mechanical ventilation 18% required cardiopulmonary resuscitations upon admission and 40% required vasopressors. 32. 4 % were admitted during duty hours.

Table 1. Socio-demographic and clinical characteristics of children admitted to the pediatric intensive care unit.

Variable	Frequency	Percent
Age in month		
<12	19	25.7
12-24	9	12.2
25-60	15	20.3
61-132	21	28.4
>132	10	13.5
sex		
Male	39	52.7
Female	35	47.3
Nutritional status of the child		
Normal	21	28.4
MAM	30	40.5
SAM	23	31.1
Primary diagnosis		
Neurologic	8	10.8
Congenital malformation	1	1.4
Cardiovascular	6	8.1
Respiratory	7	9.5
Endocrine and metabolic	1	1.4
Gastrointestinal and hepatobiliary	4	5.4
Renal	9	12.2
Hematologic oncologic	28	37.8
Infection	7	9.5



Injury and poisoning	3	4.1
Source of admission		
Emergency	29	39.2
Ward	45	60.8
Presence of comorbidity other than the underlined disease		
Yes	13	17.6
No	61	82.4
Need for mechanical ventilation		
Yes	44	59.5
No	30	40.5
Cardiopulmonary resuscitations during admission		
Yes	14	18.9
No	60	81.1
Vasopressor use		
Yes	30	40.5
No	44	59.5
Time of admission		
Duty hours	24	32.4
Working hours	50	67.6

7.2 Outcome of the patients

The ICU mortality of the patients was 25.7%~26% but its prediction using PIM-3 score were 16.4%

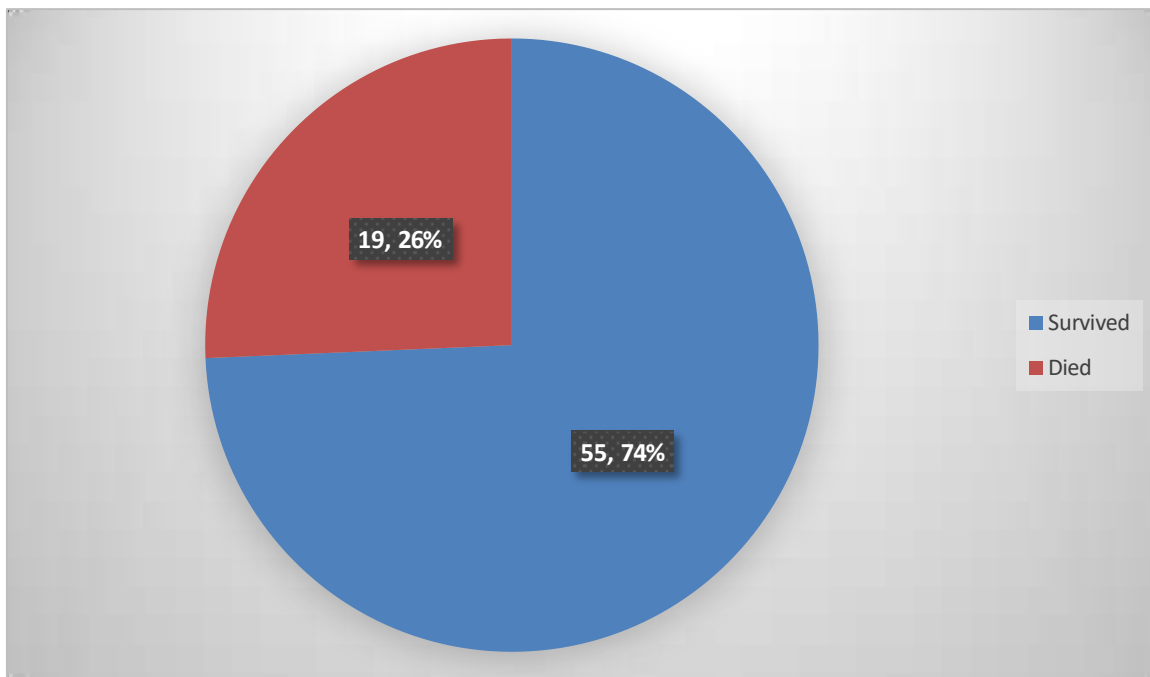


Fig 2: outcome of patients



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The mean expected mortality rate based on the PIM-3 score was 16.4 % and over one-fourth of patients (25.7 %) passed away in the PICU. The discriminatory function of the PIM-3 score is good (AUROC = 0.8495 % CI: 0.75-0.95) (Figure 3).

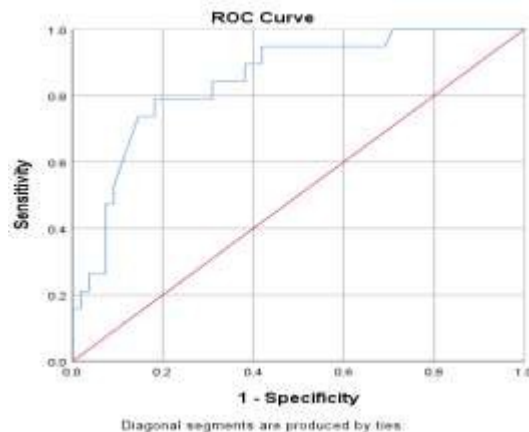


Figure 3: Receiver operating characteristics curve

In Figure 3, AUC of 0.84 (95 percent CI: 0.75-0.95) is the receiver operating characteristics curve used to predict mortality. Additionally the results revealed that the SMR was 1.56. The model's good discriminatory ability or its ability to effectively distinguish between the positive and negative classes is indicated by an AUC of 0.84. It shows that approximately 84 % of the time the model correctly ranks a random positive instance higher than a random negative instance. It implies that the model is reasonably dependable and has a high degree of accuracy when making predictions.



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Table 2. Performance of PIM 3 across Subgroups

variable	N	Mean Predicted Death	survived		Death		SMR
			observed	expected	Observed	expected	
Age in month							
<12	19	17.1	12	14.1	7	4.9	1.4
12-24	9	13.6	8	6.7	1	2.3	0.62
25-60	15	19.1	13	11.1	2	3.9	0.51
61-132	21	15.5	14	15.6	7	5.4	1.29
>132	10	15.3	8	7.4	2	2.6	0.77
Sex							
Male	39	15.7	29	29	10	10	1
Female	35	17.1	26	26	9	9	1
Nutritional status of the child							
Normal	21	12.2	15	15.6	6	5.4	1.11
MAM	30	15.5	23	22.3	7	7.7	0.91
SAM	23	21.3	17	17.1	6	5.9	1.02
Primary diagnosis							
Neurologic	8	24.1	6	5.9	2	2.1	0.95
Congenital malformation	1	5.4	1	0.7	0	0.3	
Cardiovascular	6	22.3	2	4.5	4	1.5	2.7
Respiratory	7	4.3	5	5.2	2	1.8	1.11
Endocrine and metabolic	1	0.06	1	0.7	0	0.3	
Gastrointestinal and hepatobiliary	4	5.8	3	3	1	1	1
Renal	9	9.6	9	6.7	0	2.3	
Hematologic oncologic	28	15.5	20	20.8	8	7.2	1.11
Infection	7	15.3	5	5.2	2	1.8	1.11
Injury and poisoning	3	0.36	3	2.2	0	0.9	
Source of admission							
Emergency	29	18.2	21	21.6	8	7.4	1.1
Ward	45	15.2	34	33.4	11	11.6	0.95
Presence of comorbidity other than the underlined disease							
Yes	13	14.7	9	9.7	4	3.3	1.21
No	61	16.2	46	45.3	15	15.7	0.96
Need for mechanical ventilation							
Yes	44	18.3	27	32.7	17	11.3	1.50
No	30	13.6	28	22.3	2	7.7	0.6
Cardiopulmonary resuscitations during admission							
Yes	14	39.9	4	10.4	10	3.6	2.8
No	60	10.9	51	44.6	9	15.4	0.58



Vasopressor use							
Yes	30	29.1	13	22.3	17	7.7	2.21
No	44	7.7	42	32.7	2	11.3	0.18
Time of admission							
Duty hours	24	14.9	20	17.8	4	6.2	0.65
Working hours	50	17.1	35	37.2	15	12.8	1.17

Also shown were the expected and observed results for each subgroup by age diagnosis and nutritional status (Table 2). The observed and expected survival and mortality rates were similar for all of the variables listed. Cardiopulmonary resuscitated patients had the highest mean and PIM-3 mortality (39. 9 percent) while endocrine and metabolic patients had the lowest mean PIM-3 prediction.

Observed mortality exceeded expected mortality in certain variables and vice versa. According to Table 2 the standard mortality rate was lower for congenital patients (0. 3 percent) and higher for cardiopulmonary resuscitated patients (2. 8 %).



8. DISCUSSION

In this study the mortality of the ICU admitted patients were 25.7 %. Studies conducted in Malawi (28.1 %) (19) India (28 %) (16) and Pak Emirates Military Hospital Rawalpindi (26.6 %) (17) .All corroborated this conclusion. The results however were less than those of the study conducted at Tanzanias Muhimbili National Hospital (49.8%) (18).

The study's findings are also consistent with those of a study conducted at SPMMC (28.6 %) (1). though they are marginally lower than those of a study conducted in a comparable setting a few years prior (39.1 %) (21).

There may have been a difference in mortality between the settings because of the ICUs limited capacity which resulted in overcrowding and less than ideal care for critically ill children. ICUs in more advanced settings with sufficient staffing and equipment typically have lower death rates. Disparities in healthcare workers education and experience can produce different results. Environments with more skilled staff typically have higher survival rates. However multi-drug-resistant infections can also make treatment more difficult and raise mortality rates which could be the cause of the discrepancy.

There was a difference between the expected and observed mortality rates in this study with the observed mortality rate being 25.7% and the predicted mortality rate being 16.4%. This result contradicted research conducted at Latifa Hospital in Dubai (22) and Modified Children's Hospital in Tehran (23) as well.

It is possible that this disparity resulted from the predictive models not being current or validated for the particular population under investigation. However because the models frequently rely on particular clinical factors that might not fully account for all the complexities of their conditions children with multiple underlying conditions or complex medical histories may have a higher mortality rate than intended.

The best PIM 3 score limit for predicting the mortality area under the curve (AUC) in this study was 84% (95 percent CI: 0.75-0.95). Comparing this finding to Sanglah Hospital in Indonesia it was more predictive (3). The models ability to differentiate between positive and negative classes is indicated by this. It implies that sensitivity and specificity are well-balanced indicating that the model is reasonably accurate and trustworthy.



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Comparing the current study to a study conducted in South African academic hospitals the predicted mortality was higher (7). When the expected mortality rates are constant or when mortality predictions are equally accurate in various contexts

9. STRENGTH

To the best of our knowledge this study is the first in Ethiopia to validate the mortality-3 scoring systems pediatric index which could help pediatricians and child health specialists. Additionally PIM-3 might be more useful for early detection and sending a child to a critical center for improved care and supervision and also the study was a prospective cohort.

10. LIMITATIONS

However there are restrictions on this study. Since there was not enough arterial blood gas analyser in our PICU during the study period arterial blood gas analysis was only performed on eight patients. As a result some of the variables from the PIM-3 score parameters were not available in our setup. PaO₂ was calculated by imputation from SaO₂ measured by pulse oximeter. Another drawback of this study is that in comparison to the initial study conducted to create the model it is a single-center study with a small sample size.

11. CONCLUSION

The study results demonstrated that the participants observed mortality was 25. 7% while the predicted mortality was 16. 4%. The Pediatric Index of Mortality 3 had a good discrimination score (0. 84). Since the PIM-3 scoring systems estimation was lower than the actual death rate it was used in the study setting to enhance service quality and facilitate effective and efficient resource utilization.

12. RECOMMENDATIONS

Compared from previous studies done the mortality of pediatrics patients at PICU has slight improvement but there is still a higher number of death which demands quality improvement and capacity building for better outcome of patients .The PIM-3 had a good discriminatory function can be used to prioritize care and for the assessment of the quality of care.



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Annexes

Annex I. Primary Caregiver's or patients Information sheet and Consent Form

This consent form is prepared for data collection for the research project entitled to Observed outcome and comparison to pediatrics Index Mortality 3 score of patients admitted to pediatric intensive care units at TASH Hospital.

Purpose of the study

Determining the observed outcome and comparing it to the pediatrics index mortality 3 score of patients admitted to TASHs pediatric intensive care unit is the goal of this study.

What participation involves

You and the child will be interviewed to gather information about your sociodemographic circumstances and health-related details if you agree to this study. Neither you nor the child could suffer any negative consequences from taking part in this study.

Confidentiality

All information including the identities of study participants will be kept private. There is no participant name included in the study questioner.



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Right not to participate or withdraw participation

Participation in this study is completely voluntary and you are free to change your mind at any time while it is being conducted. Regardless of involvement the child will still receive all medical care.

Benefit from the Study

The results of this study will offer important insights to enhance the care of children admitted to pediatric intensive care units. Please contact the investigator at the principals address if you have any questions about this study.

Are you volunteer to participate? Yes-----No-----

Written Informed Consent Form

I have read and comprehended the material above. I hereby consent to the use of the child's data for the study. I have signed below to confirm that I agree to let my child participate in the study.

Volunteer: Signature.....Date.....

Witness1: Signature.....Date.....

Witness2: Signature.....Date.....

Principal investigator :Melaku Moges phone : +251911481291

Email : melakumoges81@gmail.com



የስምምነት ቅጽ :

የጥናቱ የመረጃና ስምምነት ሰነድ

ይህ የመረጃና የስምምነት ሰነድ በጥቁር አንበሳ ስፔሻላይዝድ ሆስፒታል ሕክምናና ትምህርት ክፍል በህፃናት ፅኑ ህክምና ተጓተው ለሚታከሙ ህሙማን ሕጻናትና ልጆች የህክምና ሰነድ፣ የህክምና ውጤት (የ ጤና ሁኔታ መሻሻል ወይም ሞት) ለማጥናት የተዘጋጀ ነው።

የጥናቱ መነሻ ሐሳብ እና አላማ

ይህ ጥናት ጥቁር አንበሳ ሆስፒታል በህፃናት ፅኑ ህክምና ክፍል ተጓተው የሚታከሙ ህፃናት የህክምና ውጤት (የ ጤና ሁኔታ መሻሻል ወይም ሞት) እንዲሁም የጤና ሁኔታው ተሻሽሎ የ መውጣት ወይም የ መሞት ትንበያ ጋር ማወዳደር ነው ። የጥናቱ አላማ ችግሩን በመረዳት አስፈላጊው መሻሻል የሚኖርበትን ሁኔታ መፍጠር ነው።

ከእርሶ ምን ይጠበቃል?

በጥናቱ ለመሳተፍ ከፈቀዱ ስለእርስዎ የማህበራዊ ሁኔታና ስለ ልጅዎ የጤና ሁኔታ መረጃ ይሰጣሉ። በጥናቱ ላይ በመሳተፍ የሚያጋጥሙ ስጋቶች ልጅዎ ወይም እርሶ በዚህ ጥናት በመሳተፋችሁ የሚደርስባችሁ አንዳችም ጉዳት አይኖርም።

ምሥጢር ስለመጠበቅ

የጥናቱ የተሳታፊዎችን መረጃም ሆነ ማንነት በምሥጢር የሚጠበቅ ይሆናል በመሆኑም የተሳታፊው ስም በጥናቱ መጠይቅ ላይ አይካተትም።

በጥናቱ ለመሳተፍ ስለላመፈለግ ወይም ተሳትፎን ስለማቋረጥ

በጥናቱ እንዲሳተፉ አይገደዱም። እንዲሁም ተሳትፎዎን በማንኛውም ጊዜ ማቋረጥ

ይችላሉ። በጥናቱ መሳተፍ ባይፈልጉ በልጅዎ የህክምና ክትትል ላይ የሚያሳድረው ምንም ዓይነት ተጽእኖ አይኖርም።



የጥናቱ ጥቅም

ከዚህ ጥናት የሚገኘው መረጃ በጥቁር አንበሳ ስቴሻላይዝድ ሆስፒታል ለሚታከሙ ህፃናት ፅኑ ህመማን የህክምና ክፍል ህመምተኞች የሚደረገውን ህክምና እና ክትትል ለማሻሻል ይጠቅማል። በጥናቱ ወቅት ጥያቄ ቢኖሮት ማንኛውም ጥያቄ ካሎት ከዚህ በታች በተገለፀው የዋና ተመራማሪ አድራሻ በመጠቀም መጠየቅ ይችላሉ።

የተወሰኑ ደቂቃዎች ባነጋግረዎ ፈቃደኝነዎት?

ፈቃደኛ ነኝ ----- ፈቃደኛ አይደለሁም-----

የስምዎን ስነድ

ልጁ/ ልጅቱ በዚህ ጥናት እንዲሳተፍ (እንድትሳተፍ) ፈቃደኛ ስለሆኑ ለትብብርዎ በቅድሚያ እያመሰገንን ከበታች በተዘጋጀው ቦታ ላይ እንዲፈርሙ በትህትና እንጠይቃለን። ከዚህ በታች ስምና ፊርማዬ የተገለፀው ግለሰብ ከላይ የተገለፁትን መረጃዎች በማንበብ እና በመረዳት የጥናቱ ተሳታፊ ለመሆን ተስማምቻለሁ።

ስም -----ፊርማ:----- ቀን:-----

ምስክር 1 -----ፊርማ:----- ቀን:-----

ምስክር 2 -----ፊርማ:----- ቀን:-----

ዋና ተመራማሪ: መላኩ ሞገስ ስልክ: +2510911481291 ኢሜል: melakumoges81@gmail.com



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Annex 2: Questionnaire form

Part I. Patient demographic character

1. Age-----year --- month
2. Sex ----- Male -----Female
3. Nutritional status of the child-----Normal -----MAM-----SAM

Part II. Clinical profiles of patients

Primary diagnosis

1. Neurologic
2. Cardiovascular
3. Respiratory
4. Endocrine and metabolic
5. Gastrointestinal and hepatobiliary
6. Renal
7. Hematologic-oncologic
8. Infectious
9. Injury and poisoning
10. Congenital malformation
11. Others



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Source of admission

1. Emergency
2. Ward
3. Transferred from other ICU

Presence of comorbidity other than the underlined disease

1. Yes
2. No

Length of ICU stays -----days and----- hours

Need for mechanical ventilation

1. Yes
2. No

Cardiopulmonary resuscitations during admission

1. Yes
2. No

Vasopressor use

1. Yes
2. No

Time of admission

1. Duty hours
2. Working hours



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Part III ,PIM score parameters

1. Systolic blood pressure :

A. ----- mmhg

B. Not available

Record if cardiac arrest, if in shock or if SBP cannot be measured

2. Pupillary Reaction

A. >3mm or both are fixed

B. Other or unknown

3. Pao2

A. -----mmhg or-----kpa

B. Not available

4. Mechanical ventilation

A. No

B. Yes

5. Base excess

A. -----mmol/l

B. Not available

6. Elective ICU admission

A. No

B. Yes



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7. Cause for ICU Admission

- A. Main reason for ICU admission is not recovery from surgery or a procedure
- B. Recovery from a bypass cardiac procedure
- C. Recovery from a non-bypass cardiac procedure
- D. Recovery from non-cardiac procedure

8. Low-risk diagnosis

- A. None
- B. Asthma
- C. Bronchiolitis
- D. Croup
- E. Obstructive Sleep Apnea
- F. Diabetic ketoacidosis

9. High-risk diagnosis

- A. None
- B. Spontaneous Cerebral hemorrhage
- C. Cardiomyopathy or myocarditis
- D. Hypoplastic left heart syndrome
- E. Neurodegenerative disorder
- F. Necrotizing enterocolitis



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10. Very high-risk diagnosis

- A. None
- B. Cardiac arrest preceding ICU admission
- C. Severe combined immune deficiency
- D. Leukemia or lymphoma after first induction
- E. Bone marrow transplant recipient
- F. Liver failure

Part IV. Outcome of the patient

- A. Survive
- B. Died

THANK YOU!!!



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